UD-731N

User's Manual

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MADE IN TAIWAN

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1. Introduction

The UD-731N is a USB Dongle with GPS receiver and built-in NAND FLASH memory together. Users can utilize it for navigation and memory storage application. Its 50 parallel channels and u-blox 5 chip which provide short start-up time and fast signal acquisition. Having fast time-to-first-fix and high sensitivity, the UD-731N offers good navigation performance even in urban canyons.

The UD-731N is built in with NAND FLASH memory for users to utilize it for memory storage. The navigation software can also install in the built-in memory to support full navigation function with GPS receiver in the same device. It is compact and easily used with your laptop or mini notebook.

2. Package Contents

UD-731N …….. x 1

CD-ROM ……x 1

USB cable……..……x 1

3. System Requirements

The UD-731N requires the minimum to run on a laptop:

Operating System: Windows 2000 / XP/Vista, Windows 7

CPU: 500 MHz, Pentium III

System Memory: 128MB RAM

Hard Disk: 50MB free space

4. Features

- ✓ 50 channel to acquire and track satellites simultaneously
- ✓ Built in NAND FLASH memory
- ✓ Industry-leading TTFF speed
- ✓ Signal detection better than -160 dBm
- ✓ SBAS (WAAS/EGNOS/MSAS) capable
- ✓ Cold start 29seconds
- ✓ Hot start < 1second
- ✓ USB Interface
- ✓ Accuracy 2.5m CEP
- ✓ Easy-plug-in Notebook
- ✓ RoHS compliance

5. Specifications

5.1 Electronic Characteristics

Parameter	Specification
Receiver Type	50 channels
Re-acquisition sensitivity	-160dBm
Tracking sensitivity	-160dBm
Cold start sensitivity	-145dBm
Receiver frequency	1575.42MHz
Code	C/A code
Accuracy (1) Position (2) Velocity	 2.5m CEP 0.1m/sec
Startup Time hot start warm start cold start	 < 1 sec 29 sec 29 sec
Signal Reacquisition	<1s
Max navigation update rate	4Hz
Operational Limits (1) Altitude (2) velocity	 50000 m 500m/s
Dynamics	≦4G (39.2m/sec^2)
Datum	WGS-84
Protocol	NMEA-0183 V2.3
Serial Interface	USB interface
Input Voltage	5V ±5%
Power Consumption	Tracking: 150 mA
Connector	USB B-type 4P male
FLASH memory	2 or 4GB (optional)

5.2 Physical Characteristics

Parameter	Specification
Physical dimension	78.62mm X 24.83mm X 11.15mm
Weight	22+-10%g

6. Getting Started

There are only few simple steps that you need to follow before using your UD-731N:

- Install the USB driver onto your laptop using the included CD-ROM .
- Plug the GPS receiver into your laptop's USB port and assign the COM port. From within your mapping or navigation software (including the supplied GPS Application utility), you will need to manually configure the COM port that was assigned to the UD-731N GPS receiver by operation system so that proper communication between the GPS receiver and a mapping program can occur. Most software requires that you manually configure the COM port setting for any GPS device being used.

6.1 LED Status

The LED flash status:

RED LED :

1. Continue ON: GPS acquisition
2. 900ms on/ 100ms off : GPS tracking

GREEN LED :

Continue ON: while USB dongle plug into PC

7. Operations

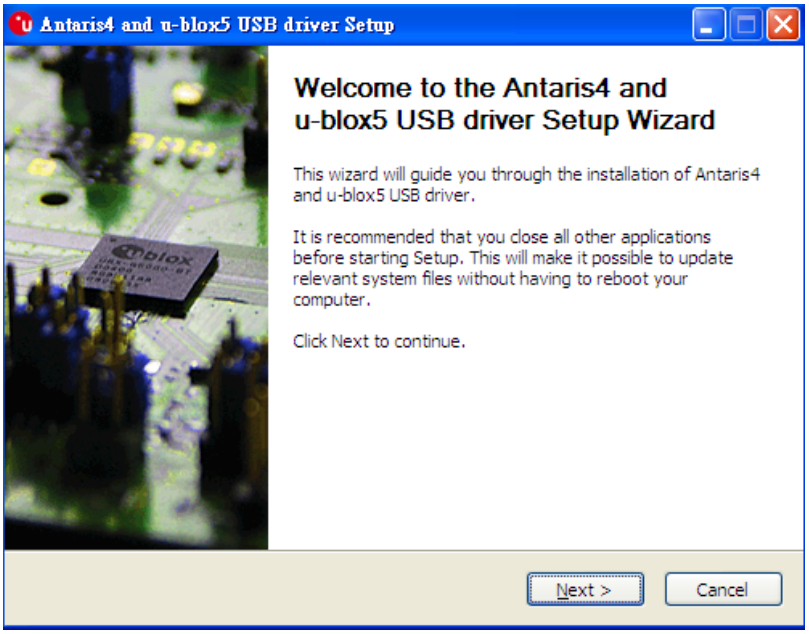
7.1 Overview

UD-731N is an easy to use device with GPS receiver and memory built-in together. After you install the USB driver on the computer or laptop, both GPS receiver and maeory can work with the computer or laptop normally.

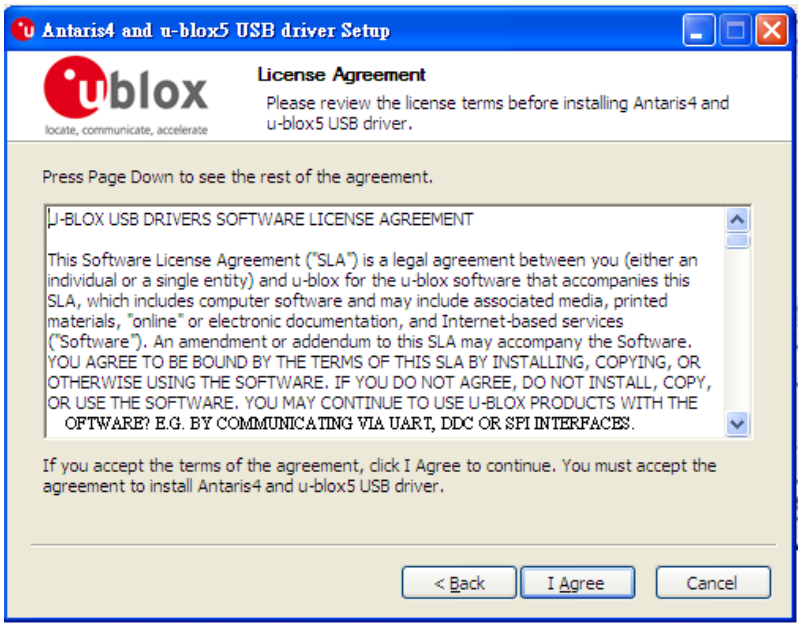
7.2 Install USB Driver

The USB driver category depends on your operating system, such as WINDOWS Vista/XP/2000, WINDOWS 7, and WINCE. Please select the right one from the CD and then follow the procedures illustrated below to install USB driver.

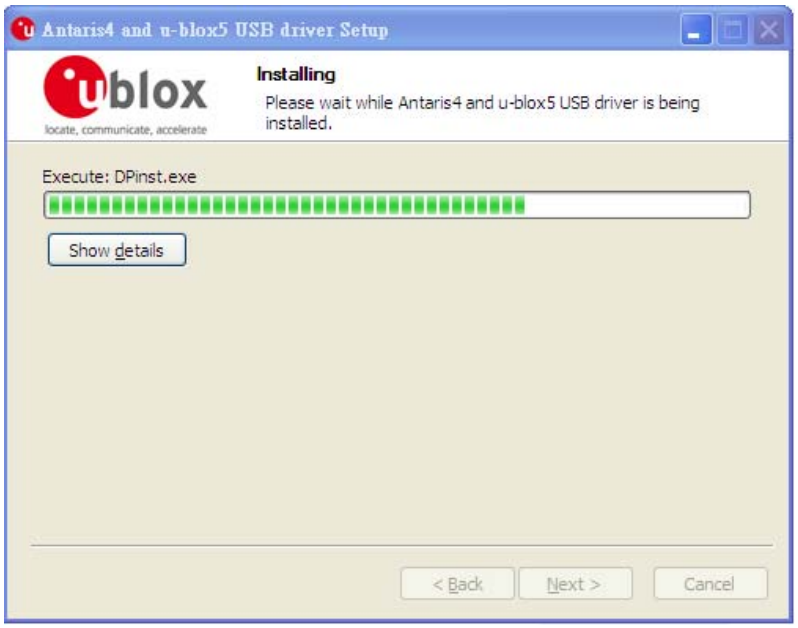
A. Click on the driver file to start.


Antaris4 and u-blox5 USB driver Setup
Welcome to the Antaris4 and u-blox5 USB driver Setup Wizard
This wizard will guide you through the installation of Antaris4 and u-blox5 USB driver.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

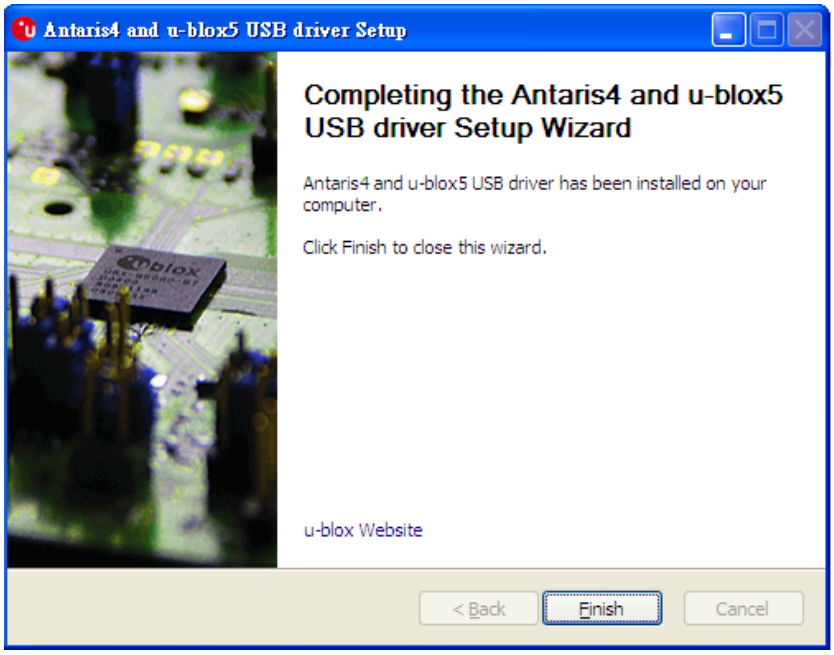
B. Review the license agreement information, and select **I Agree** to accept the licensing terms, and then click on **Next** to continue. You may click on **Back** to go to the previous step, or **Cancel** to quit.


Antaris4 and u-blox5 USB driver Setup
ublox
locate, communicate, accelerate
License Agreement
Please review the license terms before installing Antaris4 and u-blox5 USB driver.
Press Page Down to see the rest of the agreement.
U-BLOX USB DRIVERS SOFTWARE LICENSE AGREEMENT
This Software License Agreement ("SLA") is a legal agreement between you (either an individual or a single entity) and u-blox for the u-blox software that accompanies this SLA, which includes computer software and may include associated media, printed materials, "online" or electronic documentation, and Internet-based services ("Software"). An amendment or addendum to this SLA may accompany the Software. YOU AGREE TO BE BOUND BY THE TERMS OF THIS SLA BY INSTALLING, COPYING, OR OTHERWISE USING THE SOFTWARE. IF YOU DO NOT AGREE, DO NOT INSTALL, COPY, OR USE THE SOFTWARE. YOU MAY CONTINUE TO USE U-BLOX PRODUCTS WITH THE
OFTWARE? E.G. BY COMMUNICATING VIA UART, DDC OR SPI INTERFACES.
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install Antaris4 and u-blox5 USB driver.
< Back
I Agree
Cancel

C. The driver is on Installing

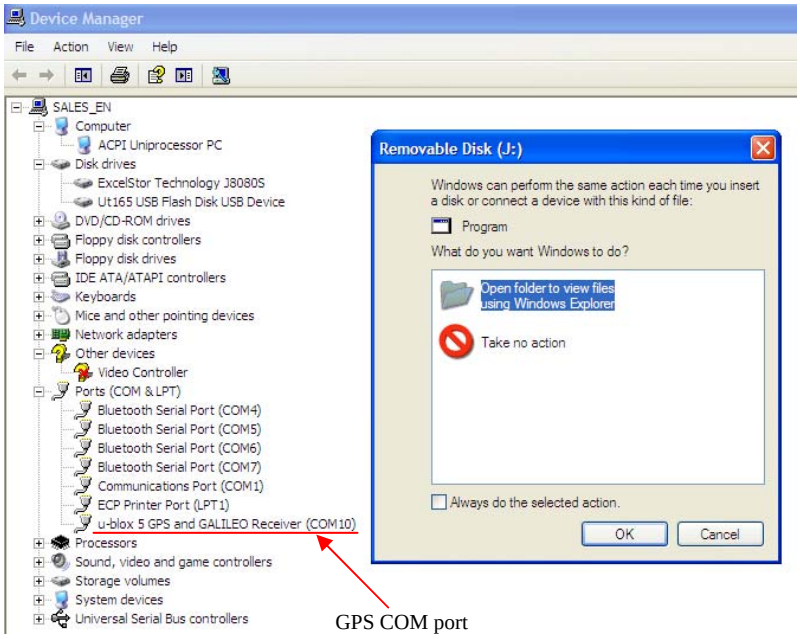


D. On the next dialogue, click Finish to complete driver installation


Antaris4 and u-blox5 USB driver Setup
Completing the Antaris4 and u-blox5 USB driver Setup Wizard
Antaris4 and u-blox5 USB driver has been installed on your computer.
Click Finish to close this wizard.
u-blox Website
< Back
Finish
Cancel

7.3 Device Manage Confirmation and Memory Usage:

Plug UD-731N into PC, the GPS COM port will appear in Device Manage. At the same time the Removable Disk will appear, therefore you can click OK button to utilize storage memory.



8. Application Software Introduction

8.1 u-Center

The u-Center application software is provides by u-blox to support the devices with their GPS chipset built-in. This section describes the simple and quick user guides to this useful program. Please refer to the user manual of this software for more details.

8.1.1 Features

u-center evaluation software provides system integrators and end users with a quick and simple way to interface with u-blox GPS chipsets, modules and boards. It enables easy evaluation, performance testing, development and debugging of GPS receivers. u-center allows easy connection to u-blox products and provides a suite of features to view, log, and analyze performance. The features include:

- ✓ Support for u-blox' latest receivers using u-blox 5 positioning technology. u-center can communicate with these receivers using either the UBX protocol, or the NMEA-0183 standard protocol.
- ✓ Support for receivers that utilize standard NMEA strings.
- ✓ u-center presents all the information collected during the operation of the GPS receiver. All aspects of GPS data (position, velocity, time, satellite tracking, etc.) can be monitored and logged under various test scenarios for the evaluation of a receiver. u-center software allows analysis of the collected data in order to investigate performance issues such as accuracy, road test position and trajectory, satellite tracking, time to first fix, etc. All processed data can be captured in ASCII format and ported into popular spreadsheets for creating additional plots and statistics.
- ✓ Camera View: photographic data can be stored in the log file together with the navigation data and later be replayed in the application.
- ✓ Export data files to Google Earth and Google Maps.
- ✓ Supports AssistNow Online and AssistNow Offline.
- ✓ Data recording and playback function.
- ✓ Structural and graphical data visualization in realtime.
- ✓ Cut and paste export to standard PC application software.
- ✓ Docking views (real-time cockpit instruments): Satellite constellation, compass, clock, altimeter, speedometer, GPS and satellite information views.

8.1.2 Starting u-center

After a successful installation, u-center will start up as shown in Figure 1:

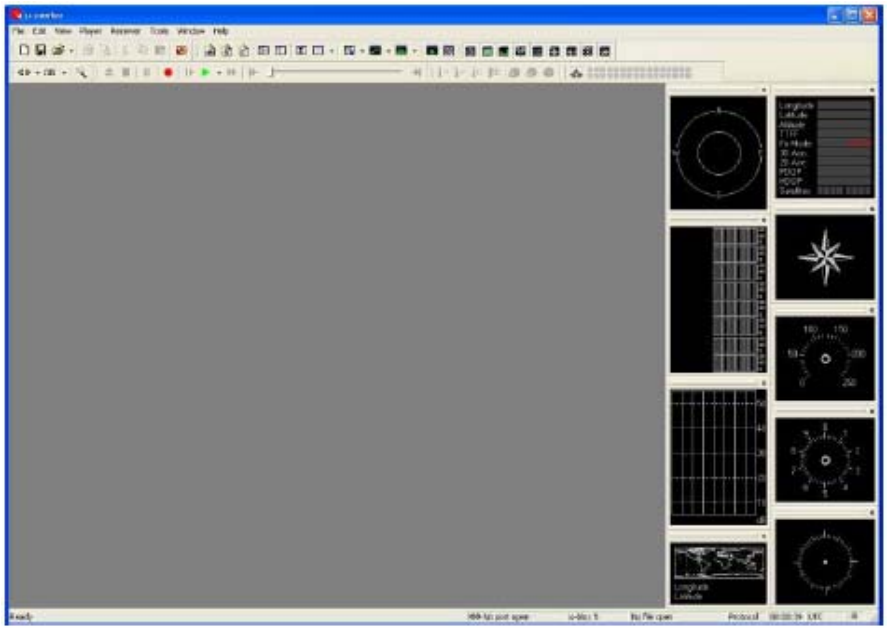
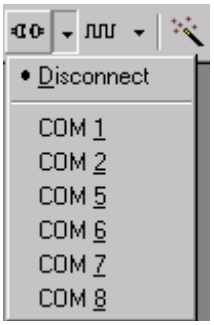


Figure 1: Start Display

8.1.3 Configuring the Serial Connection

When u-center is started for the first time, the COM port needs to be initialized. u-center supports the COM-Settings listed below and all u-blox GPS receivers are pre-configured this way.

Parity: None Data Bits: 8 Stop Bits: 1 Flow Control: none



Press the arrow in the Connect/Disconnect-Button and select the used COM-Port.

As soon as u-center is synchronized to the GPS receiver, the Connect/Disconnect-Button on the Receiver Tool Bar changes the color to green and the display shows information about the satellite constellation, signal to noise ratio, time etc.

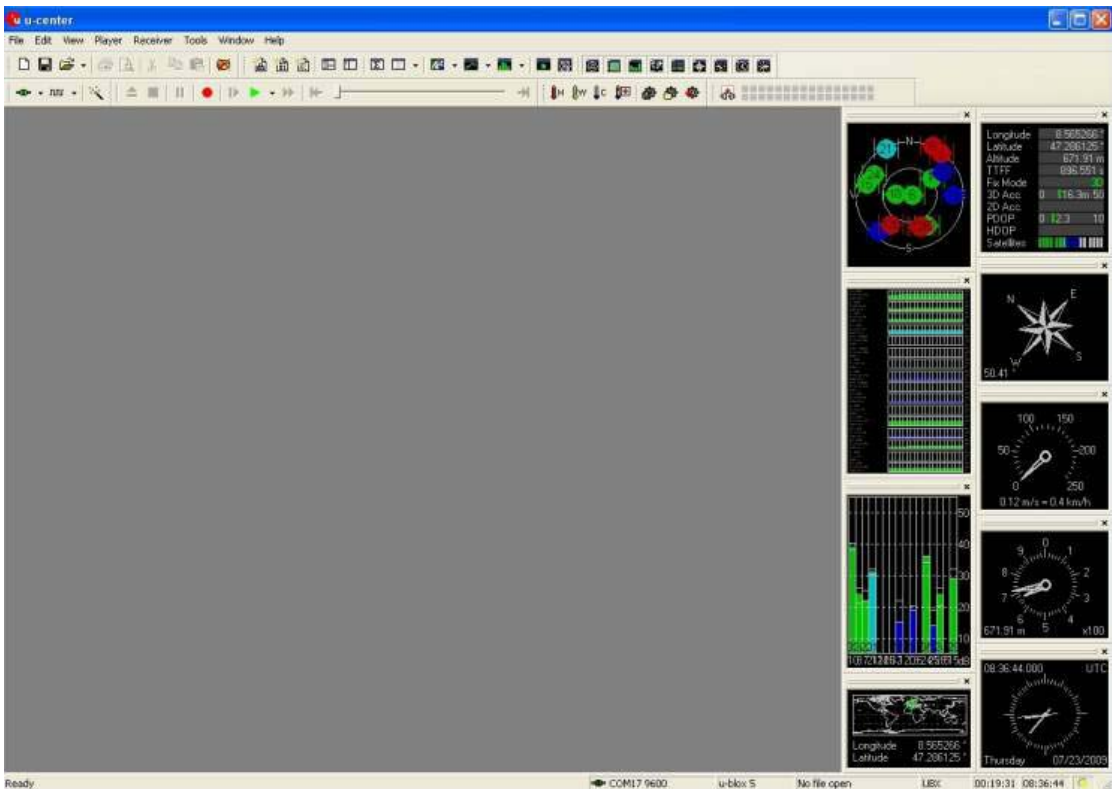
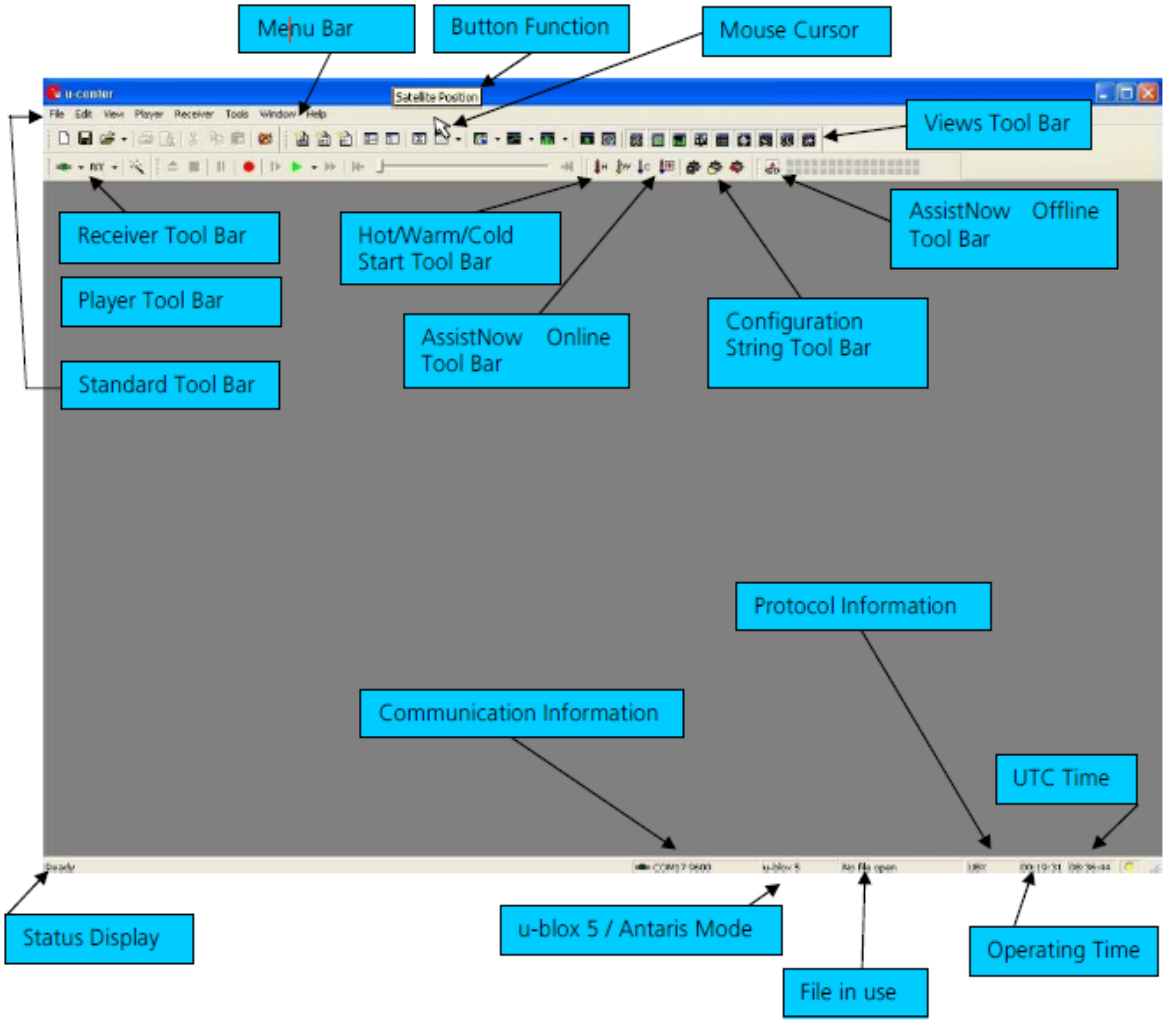


Figure 2: Start Display after a successful connection

8.1.4 Main Frame

The Main Frame is the primary display screen of u-center. It displays all tool bars and some of the information provided by the GPS receiver. In the status bar, information about communication, UTC time, Operating Time, used protocol (NMEA or UBX), used file, etc. is shown.

- ✓ **Button Function:** A description about each button in the tool bars can be obtained by holding the mouse cursor over the button for a few seconds. A Tool Tip message will appear near the Icon with additional information while a detailed description is displayed in the Status Display.
- ✓ **Status Display:** display the current action or the function of a button if the mouse cursor is over the button
- ✓ **u-blox 5 / Antaris Mode:** u-center automatically detects the type of GPS receiver connected and activates the appropriate mode of operation in order to take optimal advantage of the features. The mode can also be manually selected through the menu bar.
- ✓ **File in use:** As soon as a file is used (this file must first be opened) the name of the file will be displayed (xxxxxx.ubx).



- ✓ **Protocol Information:** This box indicates the current message set that is being used to communicate with the GPS receiver. This can be the NMEA-0183 standard or the UBX protocol. The UBX protocol provides more extensive information with the receiver. u-center can handle both protocols.
- ✓ **Operating Time:** The time elapsed since you started *u-center*
- ✓ **UTC Time: The current time sent by the GPS receiver**
- ✓ **Communication Information: Shows the active COM port and baudrate.**

Color-Coding of this icon:

- ✓ Green: data is being received at the correct baudrate
- ✓ Dark Green: the last data received was valid, but there is no data to collect at this time.
- ✓ Red: data is being received but errors are detected
- ✓ Dark Red: no data is being received but errors have been detected in the past
- ✓ Gray: waiting for first data

9. Trouble Shooting

◆ Satellite signal problem

The following situations are normally if you find the GPS satellite signal is very low or absolute missing:

- ✓ There is something cover above.
- ✓ While you are in a tunnel.
- ✓ Inside of the building.
- ✓ Near by buildings.
- ✓ Put GPS receiver inside the car, some of the sun-control film with metal that makes microwave can not be radiate.

◆ GPS not fix problem

If you see “GPS not fix” message on the screen after you enable the **UD-731N** GPS receiver, please consider the possible problems below:

- ✓ Wait few minutes. GPS position may cost several minutes.
- ✓ Make sure the **UD-731N** GPS receiver is put on a proper place. Some sun-control film for car may cutoff the satellite signal. You may replace it and try again.

10. APPROVED NMEA MESSAGE

The serial interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully define in "NMEA 0183, Version 2.3"

The standard may be obtained from NMEA, www.nmea.org

10.1 GGA – GLOBAL POSITIONING SYSTEM FIX DATA

Time, position and fix related data for a GPS receiver.

Structure:

$GPGGA,hhmmss.sss,ddmm.mmmmm,a,dddmm.mmmmm,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

Example:

$GPGGA,060932.448,2447.09599,N,12100.52049,E,1,08,1.1,108.7,M,,,,0000*0E<CR><LF>

Field	Name	Example	Description
1	UTC Time	060932.448	UTC of position in hhmmss.sss format, (000000.00 ~ 235959.99)
2	Latitude	2447.09599	Latitude in ddmm.mmmmm format ddmm.mmmmm Leading zeros transmitted
3	N/S Indicator	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	Longitude	12100.52049	Longitude in dddmm.mmmmm format Leading zeros transmitted
5	E/W Indicator	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	GPS quality indicator	1	GPS quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode 3: GPS PPS Mode, fix valid

			4: Real Time Kinematic. System used in RTK mode with fixed integers 5: Float RTK. Satellite system used in RTK mode. Floating integers 6: Estimated (dead reckoning) Mode 7: Manual Input Mode 8: Simulator Mode
7	Satellites Used	08	Number of satellites in use, (00 ~ 12)
8	HDOP	1.1	Horizontal dilution of precision, (00.0 ~ 99.9)
9	Altitude	108.7	mean sea level (geoid), (-9999.9 ~ 17999.9)
10	Geoid Separation		Geoid separation in meters according to WGS-84 ellipsoid (-999.9 ~ 9999.9)
11	DGPS Age		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12	DGPS Station ID	0000	Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	Checksum	0E	

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '$' and '*'.

10.2 GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS

Latitude and longitude of current position, time, and status.

Structure:

$GPGLL,ddmm.mmmmm,a,dddmm.mmmmm,a,hhmmss.sss,A,a*hh<CR><LF>

1 2 3 4 5 6 7 8

Example:

$GPGLL,4250.55899,S,14718.50849,E,092204.999,A,A*2D<CR><LF>

Field	Name	Example	Description
1	Latitude	4250.55899	Latitude in ddmm.mmmmm format Leading zeros transmitted
2	N/S Indicator	S	Latitude hemisphere indicator ‘N’ = North ‘S’ = South
3	Longitude	14718.50849	Longitude in dddmm.mmmmm format Leading zeros transmitted
4	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
5	UTC Time	092204.999	UTC time in hhmmss.sss format (000000.00 ~ 235959.99)
6	Status	A	Status, ‘A’ = Data valid, ‘V’ = Data not valid
7	Mode Indicator	A	Mode indicator ‘N’ = Data not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
8	Checksum	2D	

10.3 GSA - GPS DOP AND ACTIVE SATELLITES

GPS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentence and DOP values.

Structure:

$GPGSA,A,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR><LF>

1 2 3 3 3 3 3 3 3 3 3 3 3 3 4 5 6 7

Example:

$GPGSA,A,3,01,20,19,13,,,,,,,,,40.4,24.4,32.2*0A<CR><LF>

Field	Name	Example	Description
1	Mode	A	Mode 'M' = Manual, forced to operate in 2D or 3D mode 'A' = Automatic, allowed to automatically switch 2D/3D
2	Mode	3	Fix type 1 = Fix not available 2 = 2D 3 = 3D
3	Satellite used 1~12	01,20,19,13,,,,,,,,,,	Satellite ID number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	PDOP	40.4	Position dilution of precision (00.0 to 99.9)
5	HDOP	24.4	Horizontal dilution of precision (00.0 to 99.9)
6	VDOP	32.2	Vertical dilution of precision (00.0 to 99.9)
7	Checksum	0A	

10.4 GSV - GPS SATELLITE IN VIEW

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Four satellites details
are transmitted per message. Additional satellite in view information is send in subsequent GSV messages.

Structure:

$GPGSV,x,x,xx,xx,xx,xxx,xx,…,xx,xx,xxx,xx *hh<CR><LF>

1 2 3 4 5 6 7 4 5 6 7 8

Example:

$GPGSV,3,1,09,28,81,225,41,24,66,323,44,20,48,066,43,17,45,336,41*78<CR><LF>

$GPGSV,3,2,09,07,36,321,45,04,36,257,39,11,20,050,41,08,18,208,43*77<CR><LF

Field	Name	Example	Description
1	Number of message	3	Total number of GSV messages to be transmitted (1-3)
2	Sequence number	1	Sequence number of current GSV message
3	Satellites in view	09	Total number of satellites in view (00 ~ 12)
4	Satellite ID	28	Satellite ID number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	Elevation	81	Satellite elevation in degrees, (00 ~ 90)
6	Azimuth	225	Satellite azimuth angle in degrees, (000 ~ 359)
7	SNR	41	C/No in dB (00 ~ 99) Null when not tracking
8	Checksum	78	

10.5 RMC - RECOMMANDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data provided by a GNSS navigation receiver.

Structure:

$GPRMC,hhmmss.sss,A,dddmm.mmmmm,a,dddmm.mmmmm,a,x.x,x.x,ddmmyy,x.x,a,a*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

Example:

$GPRMC,092204.999,A,4250.55899,S,14718.50849,E,0.00,89.68,211200,,A*25<CR><LF>

Field	Name	Example	Description
1	UTC time	092204.999	UTC time in hhmmss.sss format (000000.00 ~ 235959.999)
2	Status	A	Status 'V' = Navigation receiver warning 'A' = Data Valid
3	Latitude	4250.55899	Latitude in dddmm.mmmmm format Leading zeros transmitted
4	N/S indicator N/S	S	Latitude hemisphere indicator 'N' = North 'S' = South
5	Longitude	14718.5084	Longitude in dddmm.mmmmm format Leading zeros transmitted
6	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
7	Speed over ground	000.0	Speed over ground in knots (000.0 ~ 999.9)
8	Course over ground	000.0	Course over ground in degrees (000.0 ~ 359.9)
9	UTC Date	211200	UTC date of position fix, ddmmyy format

10	Magnetic variation		Magnetic variation in degrees (000.0 ~ 180.0)
11	Magnetic Variation		Magnetic variation direction 'E' = East 'W' = West
12	Mode indicator	A	Mode indicator 'N' = Data not valid 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'S' = Simulator mode
13	checksum	25	

10.6 VTG - COURSE OVER GROUND AND GROUND SPEED

The Actual course and speed relative to the ground.

Structure:

GPVTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

1 2 3 4 5 6

Example:

$GPVTG,89.68,T,,M,0.00,N,0.0,K,A*5F<CR><LF>

Field	Name	Example	Description
1	Course	89.68	True course over ground in degrees (000.0 ~ 359.9)
2	Course		Magnetic course over ground in degrees (000.0 ~ 359.9)
3	Speed	0.00	Speed over ground in knots (000.0 ~ 999.9)
4	Speed	0.00	Speed over ground in kilometers per hour (0000.0 ~ 1800.0)
5	Mode	A	Mode indicator 'N' = not valid 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'S' = Simulator mode
6	Checksum	5F	

10.7 ZDA -TIME AND DATA

Structure:

$GPRMC,hhmmss.sss,dd,mm.yyyy, , ,xxx<CR><LF>

1 2 3 4 5 6 7

Example:

$GPZDA,104548.04,25,03,2004,,*6C<CR><LF>

Field	Name	Example	Description
1	UTC time	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	UTC time: day	25	UTC time: day (01 ... 31)
3	UTC time: month	03	UTC time: month (01 ... 12)
4	UTC time: year	2004	UTC time: year (4 digit year)
5			Local zone hour Not being output by the receiver (NULL)
6			Local zone minutes Not being output by the receiver (NULL)
7	6C	6C	Checksum

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